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SPOKANE COUNTY

UTILITIES DEPARTMENT
William R. Dobratz, P.E., Director

A DIVISION OF THE PUBLIC WORKS DEPARTMENT
Dennis M. Scott, P.E., Director

March 16, 1994

Mr. Neil E. Thompson, Project Manager
United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101

Dear Mr. Thompson:

Attached are our responses to the specific review comments that were transmitted to me via letter dated April 16, 1993, relating to the "Preliminary Phase II Design Plans and Specifications, Colbert Landfill RD/RA Project", and "Final Treatment and Discharge Plan, Phase II Remedial Design/Remedial Action, Colbert Landfill, Spokane, Washington."

We are confident that all the issues identified in your comments were adequately addressed in the development of the final engineering design, including the plans and specifications. Consequently we anticipate the additional information provided in our responses is sufficient to resolve your identified concerns. Please contact me if you need additional information or clarification.

Sincerely,

Dean S. Fowler, P.E.
Project Manager

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Enclosure

cc: Mike Kuntz, State Dept. of Ecology
Lyle Diedieker, Ecology & Environment

West 1026 Broadway Spokane, WA 99260-0180 (509) 456-3604 FAX (509) 456-4715

RESPONSE TO COMMENTS ON:
FINAL TREATMENT AND DISCHARGE PLAN AND
PRELIMINARY PHASE II DESIGN - PLANS AND SPECIFICATIONS

FINAL TREATMENT AND DISCHARGE PLAN

Comment 1 (EPA - 1)

> Page 2-11, 2.3.3, last para. There is no acid wash storage tank as part of the initial construction, but is the clear well adequately sized if it is added? The estimated volume of the acid wash water is 7000 gallons and the size of the only tank in the system is the clear well which is 5000 gallons.

Response to Comment:

The acid wash storage tank is incorporated in the initial construction phase. This tank, referred to as the Batch Cleaning Tank, has a capacity of 9,000 gallons.

Comment 2 (EPA - 2)

> Table 2-3, and 2-6. There appears to be an inconsistency between the Methylene Chloride concentration numbers; 625 vs. 630 and 1300 vs. 1700.

Response to Comment:

The correct value for the methylene chloride maximum influent design concentration is 625 ppb as shown on Table 2-6; the 630 ppb concentration shown on Table 2-3 should be corrected to 625 ppb. These is no inconsistency between the 1700 and 1300 ppb values in Table 2-3 and 2-6, respectively, as the 1700 ppb value in Table 2-3 is for TCA and the 1300 ppb value in Table 2-6 is for methylene chloride.

Comment 3 (EPA - 3)

> Page 4-2, 4.1.2, para 3. It should be made clear that the construction quality assurance will be done by an independent party to the construction contractor. It would be acceptable for this project for either the county or the county's hired engineers to perform this construction inspection.

Response to Comment:

Construction quality assurance and inspection will be preformed by the County's engineering consultant.

Comment 4 (Ecology and Environment #1)

> Page 2-6, 2.2.4.2, 7,500 gallons of dilute acid (10%) is required for each annual scale cleaning. Why the 5,000 gallon clear well, which will be used to hold the acid solution, needs to be emptied two or more time during each batch cleaning?

Response to Comment:

A Batch Cleaning Tank is incorporated in the initial construction phase. This tank has a capacity of 9,000 gallons.

Comment 5 (Ecology and Environment #2)

Page 2-7, 2.3.1, the last sentence in the first paragraph is awkward.

Response to Comment:

The sentence is clarified to read: "Optimization of the design is particularly important for this project because the mass transfer coefficient for the constituent that controls the design (methylene chloride) cannot be accurately predicted using basic design equations (without adjustment factors), which are commonly used for air stripping tower design."

Comment 6 (Ecology and Environment #3)

Page 2-10, 2.3.3.1, sequestering agent will be injected continuously into the air stripper influent pipe. Considerations have to be made to ensure the complete mixing of the agent and water, and enough reaction time in the pipe.

Response to Comment:

The sequestering agent will be injected at a point approximately 100 feet upstream from the air stripper influent distribution weir. This section of pipe contains four 90 degree elbows. At all expected groundwater flow rates, pipe flow will be sufficiently turbulent (i.e. Renolds Number greater than 10^6) to ensure complete mixing of the agent and water. No minimum reaction time in the pipe is required for this agent to be effective.

Comment 7 (Ecology and Environment #4)

Page 2-11, 2.3.3.2, 0.73 lb HCl is required to dissolve 1 lb of $CaCO_3$. It was stated in Section 2.2.4 that 1,900 gallons of 35% HCl was required for each annual batch cleaning.

Response to Comment:

Comment accepted regarding molar ratio, which was rounded off for presentation in the report. The correct quantity of 35 percent HCl for each annual batch cleaning is approximately 5,000 gallons.

Comment 8 (Ecology and Environment #5)

Page 2-14, Figure 2-2, should the caustic/peroxide drum be the HCl drum?

Response to Comment:

No. The HCl volume is such that the acid would be delivered in bulk in tanker trucks to the facility. The drum labelled "CAUSTIC/PEROXIDE DRUM" is correct. Liquid caustic

may be used for neutralization of the liquid in the tower following acid batch cleaning, and hydrogen peroxide may be used for batch cleaning of biofouling formation in the tower.

Comment 9 (Ecology and Environment #6)

> Page 3-2, 3.3, it is not clear why and how much potential system expansion capacity was considered in the primary conveyance pipe design. Future expansion was not considered in the air stripper design.

Response to Comment:

Additional flow capacity above the anticipated operational conditions was included in all pipeline segments. Comparing the well flow rates presented on Table 2-2 with the pipeline design flow rates presented in Table 3-1 elucidates this by inspection. Additional capacity was included in the air stripper design, which can be seen by comparing the anticipated operational conditions with the maximum design flow and the maximum design concentration conditions.

Comment 10 (Ecology and Environment #7)

> Page 3-2, 3.4, has potential corrosion of the PVC pipes by the organic solvent in the groundwater been considered in the design?

Response to Comment:

Corrosion or other degradation of the PVC pipes and associated fittings by the organic solvents in the part-per-bill range to be experienced at the Colbert Landfill was evaluated and found to be acceptable based on information and recommendations received from various pipe manufacturers and the Uni-bell PVC Pipe Association.

Comment 11 (Ecology and Environment #8)

> Page 3-3, 3.4, water hammer is a pressure wave which travels at a velocity close to the velocity of sound in the fluid.

Response to Comment:

We concur with this comment, which provides a useful addition to the explanation of water hammer contained on page 3-2 of the report.

Comment 12 (Ecology and Environment #9)

> Page 3-16, Table 3-1, anticipated flow for Well CP-E2 was presented as 5 gpm in Table 2-2.

Response to Comment:

The correct value for the design flow from well CP-E2 (segment 1-k as shown on Figure 3-1) is 5 gallons per minute, not 4 gallons per minute as reported in Table 3-1. The pipeline sizing can accommodate 5 gpm.

Comment 13 (Ecology and Environment #10

Page A-2, results, line 1. Typographical error: "Harness."

Response to Comment:

Comment accepted. First word in second sentence of section is "Hardness."

Comment 14 (Ecology and Environment #11)

Page B-3, 5), typographical error in the equation: "$C_{h,l}$."

Response to Comment:

Comment accepted. Second $C_{h,l}$ in equation 5) should be $C_{h,e}$.

Comment 15 (Ecology and Environment #12)

Page B-4, 6), typographical errors: "$C_{h,l}$", "0.5" and "95%".

Response to Comment:

Comment accepted. Second $C_{h,l}$ in equation 6) should be $C_{h,e}$. Value of 0.05 should be 0.10. Value of 95% should be 90%.

Comment 16 (Ecology and Environment #13)

Page B-4, 7), lb_{acid}/lb_{scale} should be 0.73.

Response to Comment:

Comment accepted. Value for lb_{acid}/lb_{scale} should be 0.73.

Comment 17 (Ecology and Environment #14)

Page C-3, in table 2-6, anticipated MC concentration was listed as 625 ppb.

Response to Comment:

Second paragraph under "Preliminary Phase II Design Process," second sentence, the anticipated methylene chloride concentration should be 625 ppb rather than 500 ppb.

Comment 18 (Ecology and Environment #15)

Page C-6, Calculation 6, why is molar air to water ratio used in R calculation? Based on our reference (Noonan, D.C. and J.T. Curtis, 1990, Groundwater Remediation and Petroleum, a Guide for Underground Storage Tanks, Lewis Publishers, Chelsea, Michigan.) mass ration of air mass loading to water mass loading was used in R calculation.

Response to Comment:

A variety of methodologies are available for calculation of mass transfer and stripping factors. The methodology used in the design calculations presented in this report utilizes the molar air and water ratios, and utilizes molar air and water flow rates for design calculations.

Comment 19 (Ecology and Environment #16)

Page C-7, calculation 7, u_e should be u_l.

Response to Comment:

Comment accepted (typographical error). u_e should be u_l.

Comment 20 (Ecology and Environment #17)

Page C-11, calculation 17, typographical errors: "BHP" and "blower horsepower."

Please justify the use of 10% other losses consideration in pump power calculation.

Motor efficiency was not considered in the pump power calculation.

Response to Comment:

Comment part 1 accepted. BHP shown in first definition line should be PHP. Definition of PHP should say "Required pump horsepower" rather than "Required blower horsepower."

Comment part 2 and 3. The energy calculations do not represent the total system energy requirements, but are intended to provide an approximation of the relative energy requirements for the different tower configurations. Consequently, all factors for losses and motor efficiencies were not intended to be estimated.

Comment 21 (Ecology and Environmental #18)

Page C-12, calculation 20, Table D-2 is not included in this document.

Response to Comment:

Comment accepted (typographical error). Reference to Table D-2 should be Table C-2.

Comment 22 (Ecology and Environment #19)

Page C-18, Table C-4, please check the calculation of $K_l a$. The value of 31.84 hr^{-1} can not be resulted by using Calculation 10 in page C-9.

Response to Comment:

There is a typographical error in the description of H_d. H_d is equal to 0.2194 x H_l/T where T= liquid temperature in degrees Kelvin.

Comment 23 (Ecology and Environment #20)

Page C-31, Table C-6, please check the calculation of the blower power. The values of 9 hp can not be resulted by using Calculation 16 in page C-11. Check the same calculations in the following tables also.

Response to Comment:

There is a typographical error in the description of blower efficiency. Assumed blower efficiency of 0.8 should be 0.35.

Comment 24 (Ecology and Environment #21)

Page C-41, Table C-10, negative values for $K_t a$, required packing depth and packing volume do not make any sense. Because 1,1-DCA concentration in the influent is less than require effluent concentration, the calculations in this table are unnecessary.

Response to Comment:

Comment accepted. Table did not need to be included because required effluent concentration was less than expected influent concentration.

Comment 25 (Ecology and Environment #22)

Extraction well pump selection was not present in this report. In this design, extraction pumps are arranged in parallel and groundwater will be pumped directly to the air stripper. It is not clear how the pumping rate from each well is going to be controlled in such a system, since the pumping rate of each pump will be affected by the operational adjustment of any other pump.

Response to Comment:

Comment part 1. Extraction well pump selection was performed as part of the preparation of the project plans and specifications. Each well pump motor will be powered through a variable frequency drive (VFD). The VFDs will be controlled by a programmable logic controller which will also be interfaced with central computer at the treatment facility using a radio telemetry linkage. Pump control will be implemented in either of two methods: 1) constant flow, or 2) constant groundwater surface elevation. The programmable logic controller will adjust individual pump operations as necessary to achieve the desired result.

Comment part 2. Hydraulic analysis of the pumping system and discharge piping network was conducted as part of the preparation conducted as part of the preparation of the project plans and specifications. A network analysis was conducted for the pump/piping system, in spread sheet form, which was used for sizing the pumps and the piping. The discharge pipeline was evaluated at a variety of flow conditions representing the range of anticipated flows, and for a number of separate segments of the pipeline. The discharge pipeline is a single pipeline with a single source of supply thus a network analysis was not required.

Comment part 3. The air stripper design model is principally based on the design methodology presented in the Final Phase I Engineering Report, Colbert Landfill Remedial

Design/Remedial Action, Spokane County, Washington (December 30, 1991). The equations in the referenced Engineering Report, which were used to calculate actual mass transfer rates based on pilot test data, were manipulated for use in the Final Treatment and Discharge Plan to allow evaluation of alternative tower configurations based on required influent and effluent concentrations. References for the model are provided in the Engineering Report.

REMEDIAL DESIGN
PRELIMINARY PHASE II DESIGN PLANS AND SPECIFICATIONS

Comment 1 (EPA comment)

> Table of Contents - Divisions 4 and 14 are not included nor is there any reference in the text to those divisions. We realize Divisions 4 and 14 under a recognized format probably do not apply to the project and can be omitted, but neither the format nor reason for omission was stated.

Response to Comment:

The project format is the format established by the Construction Specifications Institute (CSI). This format is one of the most widely used and recognized specification format systems in the United States construction industry. Therefore, it is not necessary to specifically identify the format. Divisions 4 (Masonry Products) and 14 (Conveying Systems) are not included because the planned treatment facility contains no materials or equipment related to these specification divisions. CSI format does not require that unused divisions be so labelled.